

10.4 Proposed BCD: Global Network

1. Overview

The ILC collaboration is truly an international collaboration with expertise in building, commissioning, and running the machine distributed on a global basis. It will require personnel with highly specialized skills in commissioning and running a machine with this level of complexity and sophistication. Given the length of construction and lifetime of the machine, concentrating all of that expertise in a single physical location is unrealistic. This means that installing, debugging, commissioning, trouble shooting, and performance tuning the machine will have significant contributions by (or under the direction of) remote experts of the collaborating institutions. The control system must support intense access and control of components, subsystem or even the entire facility from remote location(s).

2. Design & Implementation Features

The sheer size of the ILC accelerator (40km) dictates that the control system be built on a hierarchy of network interfaces, building from the local machines and diagnostic segments into an operation center that manages the entire complex. Even the operation center that is closest to the machine itself is remote and can be considered as one [of a few] remote control centers, with no more authority or privilege than a center that is a continent away. Multiple operation centers inherently provide a failover for control if the primary center becomes inaccessible.

Appropriate levels of secure access must to be designed into the system up front. This aspect may also have in impact on control system architecture, the choice of standards and platforms. In particular an extensive diagnostic layer of the hardware components and access by the control system need to be carefully designed into the system. A layered authorization and authentication system will be necessary to allow a well organized and efficient operation of the facility (where operation includes debugging, maintenance, trouble shooting, repair, tune-up, upgrades). Clear and effective inter-center communication is crucial and will be facilitated by advances in telecommunications and video links. Additional developments in commercial and freeware collaboration tools must be also explored with the option of in-house developed tools such as e-logs.

The remote operation centers will also provide an important outreach opportunity for the public to see firsthand how research is progressing at the ILC. Visitors will be able to see current activities, and gain a better understanding of the involvement of their home institutions/countries/regions in a research effort on a global scale.

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3. Needed R&D

Layered Software:

The R&D effort for tools and systems which support these needs should include the analysis and examination of the layered control system approach in the context of remote operation.

Access by Hardware Experts:

Since it is expected that the accelerator complex will be accessed by a large number of hardware experts outside the active control center, appropriate management software must be designed which supports the chief of operation in coordinating these efforts during accelerator operation. The remote experts must be supported by portable audio, video capture systems and extensive use of virtual instruments. The components to implement these feature exist, but they must be modified and tailored to according to the needs of the ILC operation.

Examples:

An R&D effort already started is the GANMVL project within EuroTev, which is developing a communication tool to support remote experts in participating in on-site efforts.

<http://ulisse.elettra.trieste.it/mvlgan/>

The design of a remote operations center is currently underway at FNAL for remote access to the CMS experiment at CERN as well as an interface to remote viewing of the LHC accelerator controls system. It is envisioned that the personnel at the FNAL center will participate in the operational shift rotation schedule for CMS.

<http://home.fnal.gov/~eeg/remop.html>

4. Cost Estimation

The incremental costs of additional regional facilities needed for the Global Network access will be addressed at the appropriate time using the standard GDE cost estimating procedures.